REMARKS

Favorable reconsideration of this application in light of the following discussion is respectfully requested.

Claims 1-12 are presently active in this case. Claims 1-5 and 7-12 are rejected under 35 U.S.C. § 102(e) over U.S. 2005/0030674 (Carey et al.) and claim 6 is rejected under 35 U.S.C. § 103(a) over Carey et al. and further in view of U.S. 6,707,084 (Katti et al.).

The present invention as recited in the pending claims is directed to a spin-tunnel transistor having an emitter, a collector formed adjacent to the emitter, and a base form between the emitter and the collector having a magnetization pinned layer, a magnetization free layer and a non-magnetic layer between the magnetization pinned layer and the magnetization free layer, and a magnetic head. The transistor and the head have a tunnel barrier layer of antiferromagnetic material formed between the magnetization pinned layer and one of the emitter and collector. The tunnel barrier layer is dielectric and tunnel conductive. The spin-tunnel transistor and the head of the pending claims is not disclosed or suggested by the cited prior art.

Carey et al. discloses a structure in Figure 3A having a magnetization-free layer 105, a conductive layer 104, a pinned layer 103 and a coercive ferrite pinning layer 132. Formed on layer 132 are an oxide underlayer 134 and an alumina underlayer 135. Layer 132 is provided for pinning the pinned layer while oxide underlayer 134 does not have a magnetic moment (see paragraph [0043]) and thus cannot fix the magnetization of the pinned layer. As stated in paragraph [0042], underlayer 134 is provided to direct the growth of coercive ferrite layer 132. It is also noted that leads 112 formed on the sides of the structure are provided to produce a sensing current, where the sense current is measured to detect the varying device resistance induced by the external magnetic field, as stated in paragraph [0006].

The structure shown in Figure 3A of Carey et al. makes no mention of an emitter or a collector. Layers 136 and 138 are shields and are not described as an emitter or a collector. The Office Action simply states that layers 136 and 138 are an emitter and collector. Simply stating so is insufficient. There must be something in Carey et al. explaining that layers 136 and 138 are an emitter and collector in order to properly reject the claims under §102.

Also, the tunnel barrier layer of the pending claims is exchange coupled with an adjoining one of the magnetization pinned layer, and the magnetization of the magnetization pinned layer being fixed by the exchange coupling between the magnetization pinned layer of ferromagnetic material and the tunnel barrier of antiferromagnetic material. Underlayer 134 does not pin the pinned layer. Pinning is accomplished through layer 132 (see paragraph [0044]). Carey et al. cannot be considered to have a transistor of claim 1 or the heads of claims 7 and 10 for this additional reason.

Lastly, layer 134 is not described as a tunnel layer or as tunnel conductive in Carey et al. From the description of Carey et al., it is clear that there is no suggestion of layer 134 being tunnel conductive tunnel barrier layer since there does not appear to be any tunneling associated with layer 134. It is clear that Carey et al. does not disclose a tunnel barrier layer.

It is therefore respectfully submitted that Carey et al. cannot be used to reject claims 1, 7 or 10 under 35 U.S.C. § 102 since it clearly lacks numerous elements recited in each of claims 1, 7 and 10. Withdrawal of the rejection of claims 1, 7 and 10 based upon Carey et al. is respectfully requested.

The Office Action looks to Katti et al. for a spin valve, as shown in Figure 4, having an antiferromagnetic (AFM) layer 414. Even if such teachings were applied to Carey et al., the structure would still fail to disclose or suggest the transistor recited in claims 1, 7 and 10 since there still would be no tunnel barrier layer. Substitution of layer 414 in the structure of Carey et al. would still result in the same lack of a tunnel barrier layer. Also, layer 414

should not "be so thick that pinning of the soft layer results" (col. 6, lines 48-50) and there is no suggestion that layer 414 pins a pinned layer of ferromagnetic material, as recited in claims 1, 7 and 10. It is respectfully submitted that claims 1, 7 and 10 are also patentably distinguishable over a combination of Carey et al. and Katti et al.

It is respectfully submitted that the present application is in condition for allowance, and a favorable action to that effect is respectfully requested.

Respectfully submitted,

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